

CLAIMS

What is claimed is:

1. A porous carbon body having an electronically conductive hydrophilic agent for use in an electrochemical cell, the body comprising:
 - a. an electronically conductive graphite powder in
5 an amount of between 67% - 87% by weight of the body;
 - b. a thermoset binder in an amount of between 6% - 18% by weight of the body; and,
 - c. a modified carbon black electronically conductive
10 hydrophilic agent in an amount of between 2% - 20% by weight of the body, the modified carbon black being carbon having attached at least one organic group, the organic group comprising i.) at least one aromatic group or a C₁-C₁₂ alkyl
15 group, and ii.) at least one ionic group, one ionizable group, or a mixture of an ionic group and an ionizable group wherein the ionic or the ionizable group is a sulfonic acid or a salt thereof, wherein the at least one aromatic group
20 or C₁-C₁₂ alkyl of the organic group is directly attached to the carbon, and the organic group is present at a level of from about 0.10 to about 4.0 micromoles/m² of the carbon used based on the nitrogen surface area of the carbon.
2. The porous carbon body of Claim 1, wherein the body has a mean pore size of greater than 2.0 microns, and an open porosity of greater than 25% of the body.

3. The porous carbon body of Claim 1, wherein the body has a bubble pressure of greater than 5 pounds per square inch.

4. The porous carbon body of Claim 1, wherein the thermoset binder is a thermoset binder selected from the group consisting of a phenolic resin, a vinyl ester resin, an epoxy resin, a diallylphthalate resin, and a urethane resin.

5. The porous carbon body of Claim 1, wherein the pores of the body are sufficiently hydrophilic to wick fill to greater than 70% of a vacuum filled level.

6. A porous carbon body having an electronically conductive hydrophilic agent for use in an electrochemical cell comprising:

- a. an electronically conductive graphite powder in an amount of between 60% - 80% by weight of the body;
- b. a carbon fiber in an amount of between 5% - 15% of the body;
- c. a thermoset binder in an amount of between 6% - 18% by weight of the body;
- d. a modified carbon black electronically conductive hydrophilic agent in an amount of between 2% - 20% by weight of the body, the modified carbon black being carbon having attached at least one organic group, the organic group comprising i.) at least one aromatic group or a C₁-C₁₂ alkyl group, and ii.) at least one ionic group, one ionizable group, or a mixture of an ionic group and an ionizable group wherein the ionic or the ionizable group is a sulfonic acid or a salt thereof, wherein the at least one aromatic group

25 or C₁-C₁₂ alkyl of the organic group is directly attached to the carbon, and the organic group is present at a level of from about 0.10 to about 4.0 micromoles/m² of the carbon used based on the nitrogen surface area of the carbon.

7. The porous carbon body of Claim 6 wherein the body has a mean pore size of greater than 2.0 microns, and an open porosity of greater than 25% of the body.

8. The porous carbon body of Claim 6, wherein the body has a bubble pressure of greater than 5 pounds per square inch.

9. The porous carbon body of Claim 6, wherein the thermoset binder is a thermoset binder selected from the group consisting of a phenolic resin, a vinyl ester resin, an epoxy resin, a diallylphthalate resin, and a urethane resin.

10. The porous carbon body of Claim 6, wherein the pores of the body are sufficiently hydrophilic to wick fill to greater than 70% of a vacuum filled level.

11. A method of forming a porous carbon body having an electronically conductive hydrophilic agent for use in an electrochemical cell, the method comprising the steps of:

- 5 a. mixing together an electronically conductive graphite powder in an amount of between 67% - 87% by weight of the mixture, a thermoset binder in an amount of between 6% - 18% by weight of the mixture, and a modified carbon black electronically conductive hydrophilic agent in a
10 amount of between 2% and 20% by weight of the mixture, the modified carbon black being carbon

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15 having attached at least one organic group, the
organic group comprising i.) at least one
aromatic group or a C₁-C₁₂ alkyl group, and ii.)
at least one ionic group, one ionizable group, or
a mixture of an ionic group and an ionizable
group wherein the ionic or the ionizable group is
a sulfonic acid or a salt thereof, wherein the at
least one aromatic group or C₁-C₁₂ alkyl of the
20 organic group is directly attached to the carbon,
and the organic group is present at a level of
from about 0.10 to about 4.0 micromoles/m² of the
carbon used based on the nitrogen surface area of
the carbon; and,
25 b. then simultaneously compressing and heating the
mixture in a mold at a pressure of between 250 -
1,000 pounds per square inch and at a temperature
of between 300 - 450 degrees Fahrenheit to form
a body having a mean pore size of greater than
30 2.0 microns and an open porosity of greater than
25%.

12. The method of Claim 9, wherein the mixing together
step further comprises mixing with the electronically
conductive graphite powder, thermoset binder, and modified
carbon black, a carbon fiber in an amount of between 5% -
5 15% by weight of the mixture.